Groups Hiking the Emerald Pools Trail Complex

Zion National Park

If you are willing to split up a large group, you may want to try trails within the Emerald Pools Trail Complex. Zion Lodge or Grotto Picnic Area can be used as drop-off or pick-up points. (You may wish to review shuttle information in the *Zion Map & Guide* if you are visiting between April and October. If you are traveling on a school bus, please read "The Zion Canyon Scenic Drive" section of the online *Educational Field Trips* brochure for information on taking your bus up Zion Canyon while the shuttle is in operation.)

Please allow no more than one class of students (20 - 30) on the same part of a trail at a time. **One adult chaperone for at least every 10 students** is highly recommended. Most of these trails are rated as moderate and have drop-offs, so please read the information on both sides of this sheet before making a decision on which trail(s) to take.

•Lower Emerald Pool Trail: Easy, .6 mile one-way, 69 foot ascent. Paved trail to the pool, then goes behind the waterfalls that cascade from the Middle Pools into the Lower pool. Minor drop-offs. Connects to the Middle Emerald Pool Trail to form a moderate, 1.6 mile loop. Trailhead is across from Zion Lodge. Once across the footbridge, turn right.

•Middle Emerald Pools Trail: Moderate, 1 mile one-way, 150 foot ascent. Unpaved climb, including steps to a sandstone ledge that parallels the lower trail but at a higher level. Long drop-offs. Do not go near the edge. Deaths have occurred from falling from the middle pools. Trailhead is across from Zion Lodge. Once across the footbridge, turn left. Or alternatively, you can connect via the Lower Emerald Pool Trail for a moderate, 1.6 mile loop. For natural and cultural information which you can share with your students, see "Along the Kayenta and Middle Emerald Pools Trail."

•Kayenta Trail: Moderate, 1 mile one-way, 150 foot ascent. Unpaved climb to a sandstone ledge, connects The Grotto Picnic Area to the Emerald Pools. Trailhead is across from the Grotto Picnic Area. For natural and cultural information which you can share with your students, see "Along the Kayenta and Middle Emerald Pools Trail."

•Grotto Trail: Easy, .5 mile one-way, level. Trail connects Zion Lodge to The Grotto Picnic Area. Can be linked with Emerald Pools and Kayenta Trails allowing a 3 mile loop hike. (Follow Middle Pools Trail to Lower Pools and backtrack a short distance to pick up Kayenta Trail towards The Grotto.)

TO THE TEACHER — IMPORTANT

•**Caution:** It is your responsibility to ensure the students maintain a safe attitude while hiking in the park. Take care to stay on the trails at all times. The trails parallel the top of the cliffs, and although they are marked and safe, several persons have fallen to their deaths going off-trail to the cliff edge. The cliff edges are unstable, down-sloping, and slippery. Supervise your students closely. There are other hikers below so do not roll rocks or drop anything.

•Swimming, wading, and bathing are prohibited in all of the pools to protect the aquatic wildlife and to return the water to its original emerald color.

•Some trails may be closed at times during the winter because of ice on the trails or ice falling from above.

OTHER HIKING OPPORTUNITIES FOR GROUPS

Easy frontcountry trails suitable for larger groups include:

•Pa'rus Trail: Paved, 1.7 miles one-way, start at the Zion Canyon Visitor Center. Trail ends at Canyon Junction.
•Riverside Walk: Paved, 1 mile one-way, start at Temple of Sinawava. May be closed at times during the winter because of ice on the trails or ice falling from above.

Along the Kayenta and Middle Emerald Pools Trails

Zion National Park

The following material provides background information on the area traversed by the Kayenta and Middle Emerald Pools Trails. There is no general order in which to use the materials, and with the exception of a few specific sights along the trails, this information was designed to be used as a general summary of the natural and cultural history. Before beginning your hike, please review the trails' physical and safety information in the "Trail Guide" section of the *Zion Map & Guide*.

GEOLOGY

Zion is part of a large geologic region of the United States called the Colorado Plateau, which covers much of southern Utah and Colorado and much of northern Arizona and New Mexico. The essentials of Zion's geology can easily be described along the Kayenta and Middle Emerald Pools Trails since the park's two most important rock formations (out of nine total) are seen from them.

One simple line, "uplifted and eroded sedimentary rock," captures the essence of Zion's geology and includes the following four "events" in Zion's geologic story. (These same events apply to the geology of other national parks on the Colorado Plateau, including Grand Canyon, Bryce, and Arches.)

1. Sedimentation

According to geologists, between 240 and 120 million years ago, much of this area was very low in elevation and experienced dramatic changes in environmental conditions. Sediment from surrounding areas accumulated in distinctive layers, later to be called formations. The lower formation you see gives one of the trails its name, the Kayenta. This is the vegetated slope through which the trails pass, rising from the canyon bottom to the base of Zion's magnificent vertical cliffs. The Kayenta formation was once a low-lying area covered with lots of water in the form of ponds, streams, and swamps. It was deposited during Jurassic times and was home to numerous dinosaurs. A paleontology student who worked in Zion during two recent summers found large numbers of fossilized dinosaur tracks in the Kayenta, including those of a dinosaur called Dilophosaurus, featured in the movie Jurassic Park.

The formation above the Kayenta, called the Navajo, gives Zion its real character. The Navajo formation was once a huge desert, extending from southern Wyoming to southeastern California. The accumulation of sand in the Navajo Desert was most impressive. It was between 2000 and 3000 feet thick, at least 4-5 times the thickness of sand in today's Sahara Desert.

2. Lithification

The term "lifthification" means "transformation into stone." The weight of more sediment on top of Zion's layers helped to compress the sediment into stone. More importantly, these sediments were deposited at very low elevations, so groundwater seeped through carrying mineral "cements." These cements include such familiar minerals as calcium carbonate (component of chalk and bathtub rings) and iron oxide (rust).

Lithification transformed different kinds of sediment into different kinds of rock. The Kayenta sediments became shale, siltstone, and mudstone. The Navajo Desert became sandstone. Because the Navajo Desert was so thick, Zion has the thickest sandstone, and therefore, the tallest sandstone cliffs (some up to 2000 feet) in the world.

3. Uplift

According to geologists, beginning about 50 million years ago, two plates (segments of the Earth's crust)—the Pacific Plate to the west and the North American Plate to the east—began to collide, resulting in the uplift of mountains throughout western North America, along with the Colorado Plateau. How much uplift has occurred? Atop the Navajo

Sandstone is another formation, composed of limestone, called the Carmel. Within this layer are fossilized seashells. The Carmel formation, now at an elevation of 7000-8000 feet, was once at the bottom of a shallow sea!

Uplift is still in progress. Good evidence for this is seismic activity. In 1992, a 5.9 Richter Scale earthquake shook southwestern Utah, producing a slump of unstable ground in Zion's gateway town of Springdale, and destroying three houses which had recently been built atop the slump.

4. Erosion

According to geologists, during the last 15 million years the tiny Virgin River has been primarily responsible for the downcutting of Zion Canyon. As sediment is carried down from above, the river acts much like sandpaper, cutting deeper into the canyon.

The North Fork of the Virgin River watershed covers over 350 square miles of land. All the water from rain and snow in the watershed that doesn't soak into the ground eventually flows into the Virgin River, down through the Narrows and Zion Canyon below you. A sudden or widespread thunderstorm, or a heavy spring snow melt can dump enormous amounts of water into the Virgin River, causing flash flooding downstream.

The Virgin River's flow is measured in cubic feet per second (CFS). On a normal summer day, the CFS is around 50. But during a flash flood, the CFS can quickly rise to several thousand (9000 CFS for the most powerful recorded flash flood in Zion). One major flash flood on the Virgin River can cause as much erosion as five years of "normal" flow.

RED · ARCH · MOUNTAIN

Red Arch Mountain

As you walk the first part of the Kayenta Trail, and about mid-way along the Middle Emerald Pools Trail you can see Red Arch Mountain on the other side of Zion Canyon. This peak contains a large and conspicuous arch. The formation of arches relates to the composition of Navajo Sandstone itself, which is like a giant sponge. Some 15-20% of the volume of Navajo Sandstone is pore space, through which groundwater seeps. When the water reaches the less permeable Kayenta formation, it begins to emerge from the rock. As this occurs the mineral cements in the sandstone dissolve away, allowing the water to erode an alcove into the rock. Soon, there is no support for the sandstone above the alcove, and the rock begins to fall away. The rock breaks along the path of least resistance, which usually occurs in the shape of a rounded arch.

In 1880, Mormon pioneer O.D. Gifford had a corn crop at the base of Red Arch Mountain. One day he returned from church to find the arch a little bigger and his cornfield buried under a huge pile of rocks!

LADY · MOUNTAIN

Lady Mountain

Above the Middle Emerald Pools Trail and to the south of the Kayenta Trail is Lady Mountain, a high peak with a sheer cliff face on its north side. At an elevation of 6945 feet, it rises close to 3000 feet above the canyon floor. It was given its name because early pioneers claimed they could see the figure of a lady in its north face. Today, however, some find the figure difficult to see. Perhaps it was a very lonesome pioneer who named it!

This imposing, almost perpendicular peak appears unscalable, but people began to climb it in the late teens and early 1920's, even before a trail was built to its top. In 1924, rangers constructed a trail up this harrowing route, providing thrills for even experienced climbers. They carved 1400 stairs into the stone and added two ladders and 2000 feet of cable hand line. There were places where hikers had to flatten themselves out against the sheer walls and shuffle across narrow ledges. The trail rose 2500 feet in 2.4 miles, an incline twice as steep as that of Angel's Landing.

One group who made the trek in 1925 was so joyous upon reaching the summit that they formed a club to encourage others to attempt the thrilling climb. Believing that Lady Mountain should be re-named Mt. Zion, they called their organization the Mt. Zion Mountaineers. By the 1930's the club had close to 500 members from several different countries.

Unfortunately, not every experience was so joyous. Two deaths, many injuries, and a number of lost hikers and difficult rescues would eventually convince park management to close the trail. The ladders and cables were removed in 1978. Today occasional adventurers follow the fading trail markers and use rope in place of the ladders to reach the summit. Along the way they will most likely marvel that this was once a place where ordinary sightseers were allowed and even encouraged to come.

The name, Mt Zion never caught on and the park service officially adopted the name Lady Mountain. As you reach the end of the Kayenta Trail or the pools along the Middle Emerald Pools Trail, stop and look up at the peak and see if you can make out the face of the lady in the mountain.

VEGETATION

Pinyon-Juniper Community

Three major vegetation zones of Zion can be seen from both trails. Along the rim of the sandstone peaks above you, and extending for miles onto the high plateau surrounding Zion Canyon, are vast forests of ponderosa pines. Some of these trees are over 80 feet tall. The high plateau is very different from the rest of Zion. It is 10-15 degrees F. cooler, snowbound in winter, and considerably wetter (as moist air masses rise when they hit the sandstone walls, the moisture condenses, and precipitation drops on the plateau.) Ponderosa pines are well adapted to these conditions.

On the Kayenta formation and along the trail itself is the "pygmy" forest, or pinyon-juniper community, named for the pinyon pines and Utah junipers which are common along the trails. Other common plants of this community include singleleaf ash, manzanita, turbinella live oak, prickly pear cactus, and datil yucca. This area is more desert-like and the vegetation is adapted to the hotter and drier conditions. Notice that most of the plants have relatively small or thick leaves for water conservation. The vegetation in this environment is typically slow-growing and long-lived. A Utah juniper, for example, may live up to 700 years.

On the canyon bottom are groves of cottonwood trees, which, along with velvet ash and boxelder, comprise the riparian community. Since the Virgin River moistens the soil throughout the canyon bottom, riparian trees have plenty of water at their disposal. A large cottonwood, for instance, may consume up to 1500 gallons of water in a single day! Trees of this environment grow very rapidly and are very short-lived. A large, mature cottonwood may live to be only 75 years old.

WILDLIFE

Whiptail

Zion is home to a diversity of wildlife including 77 mammals, 32 reptiles and amphibians, and over 290 species of birds. Mule deer, rock squirrels, coyotes, porcupines, and skunks are some of the most visible mammals. Several species of lizards are easily seen, but snakes are harder to find (the only venomous snake in Zion is the Great Basin Rattlesnake). Common birds include the Common Raven, Turkey Vulture (summer), and Wild Turkey.

Some animals prefer particular habitats. Look down at the cottonwoods growing along the Virgin River, and you will notice that some of them have been chewed by beavers. The beavers living along the Virgin River don't build dams or lodges because flash floods would

Bark chewed by porcupine

wipe them out. Instead, they construct underwater tunnels in the river's banks. At the end of each tunnel is a chamber in which a family of beavers may spend the day. These "bank beavers" emerge at night to feed on trees and other vegetation, and are rarely seen.

Evidence of other animals can often be seen in the pinyon/juniper forest along the Kayenta or Emerald Pools Trails. Many of the pinyon pines have been chewed by porcupines, (*at left*) which climb the trees and feed on the living tissue beneath the bark. The Red-naped Sapsucker (a type of woodpecker) pecks horizontal lines of holes in pinyon pines. The bird returns later to lap the sap, which drips from the holes, and to feed on insects that are also attracted to the sap. Mammals, such as grey fox, skunks, and ringtail cats leave their "calling cards" in the form of droppings on the rocks. In autumn, the scat frequently contains a purple juice and plentiful seeds, evidence that they've been feeding on the fruit of prickly pear cactus.

The pinyon/juniper community is home to the Pinyon Jay, a medium-sized blue-gray jay which usually travels in large, noisy flocks. Pinyon Jays feed mostly on the seeds of pinyon pines. The birds bury many seeds in the ground and dig them up in spring as food for their young. Since the jays can't always remember where they have stored their seeds, they help to plant more pinyon pines in the process.

Animals that prefer the high plateau include elk, Red Crossbill (a bird), Steller's Jay, and Short-horned lizard.

MICROHABITATS

Microhabitats viewed from Kayenta Trail

Two "microhabitats" can be viewed from either trail. On the Kayenta Trail, they can be seen when the trail reaches a point where you can view the small waterfalls dropping from the Middle to Lower Emerald Pools (*left*). On the Middle Emerald Pools Trail, continue past the Middle Pools and continue climbing down the stairs to reach the Lower Emerald Pool area.

Above and to the left of the Middle Emerald Pools is a patch of evergreen trees including Ponderosa pine, fir, and Douglas-fir. These trees typically grow only on Zion's high plateau, but this cool, shady, north-facing spot is very similar to the high plateau, so they are doing well. Certain high plateau birds that are not usually found anywhere else in the canyon come to this patch of trees in winter.

Look below the waterfalls, and you will notice that water is seeping from the rock. This occurs when groundwater reaches the less permeable rock beneath the porous Navajo Sandstone. Imagine the grains of sand in the sandstone as large basketballs, and water droplets as marbles. The water "marbles" make their way downward through the large spaces between the "basketballs," until they hit the less permeable Kayenta formation, a wall of "frozen peas." The Kayenta formation is mostly shale composed of tightly packed silt particles. Because the water droplets are blocked from moving further downward through the shale, they are forced sideways and seep through the rock, creating a springline. The presence of water along the walls allows lush vegetation, including mosses, grasses, ferns, and wildflowers (columbine, monkey flower, and shooting star, in season) to grow. These areas of vegetation are referred to as "hanging gardens." Other places to see hanging gardens in Zion Canyon include Weeping Rock and along the Riverside Walk.

MIDDLE · AND · LOWER · EMERALD · POOLS

The Emerald Pools are formed by a small year-round creek coming out of Heaps Canyon, named after a Mormon pioneer of the 1870s. The pools themselves were named for the emerald green color caused by algae growing in them.